

Obtaining Stokes Parameters From The SUMI Experiment

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A sounding rocket experiment designed at the Marshall Space Flight Center, named the Solar Ultraviolet Magnetograph Investigation, had its second launch in July of 2012 to test the feasibility of measuring polarization signals of the ionized magnesium resonance doublet near 280 nm, originating from the transition region. The rocket housed a telescope at the front end and an imaging system at the rear end. Placed at the focal point of the self-filtering telescope, a wave plate rotated through 12 predefined angular orientations to restrict the measurements to specific combinations of circular and linear polarization. Coupled with a double Wollaston analyzer, the linearly polarized ordinary and extraordinary beams were measured for the 12 combinations, each containing different fractions of the Stokes parameters (I, Q, U, V). A thorough analysis of the data has allowed us to come to several conclusions regarding the design of the experiment. 1) We are confident that polarization can be measured. A sunspot region was determined to exhibit similar results over multiple pixels. 2) Measurements are limited by resolution, i.e. regions smaller than the angular resolution per pixel cannot be resolved with any certainty. 3) Temporal evolution of magnetic features must be considered in future experimental designs. Measurements need to be taken in repeated cycles as opposed to a single cycle over the duration of the experiment. In our presentation, we will provide a summary of the observations along with the methods of our analysis, including the limitations that we've encountered.